WHAT IS CLAIMED IS:

1. A process of forming a coating on a substrate, the process comprising:

a) removing layers of a multilayer fullerene coating leaving an approximate monolayer coating of fullerene molecules on the substrate, wherein the fullerene is removed while the temperature of the substrate remains no more than about 200 degrees C.

2. The process of claim 1, wherein the substrate is maintained at a temperature no more than about 150°C during the removal of fullerene from a multilayer fullerene coating.

3. The process of claim 1, wherein the substrate is maintained at a temperature no more than about 100°C during the removal of fullerene from a multilayer fullerene coating.

4. The process of claim 1, wherein removing of fullerene from a multilayer fullerene coating includes:

a1) adjusting a beam generator to produce a beam arranged to break the fullerene-to-fullerene intermolecular bond of the multilayer coating and inadequate to break the fullerene-to-substrate association/bond of the coating, and

a2) directing the beam at the multilayer coating to break the fullerene-to-fullerene intermolecular bond.

5. The process of claim 4, wherein the beam generator is an ion beam generator.

6. The process of claim 4, wherein the beam generator is a gas cluster ion beam generator.

7. The process of claim 4, wherein the beam generator is a laser beam generator.

8. The process of claim 4, wherein the laser beam generator produced a laser frequency below the ultraviolet frequency range.

9. The process of claim 4, wherein the beam generator is an electron beam generator.

10. The process of claim 4, wherein step (a2) includes:
directing the beam at an acute angle to the substrate.

11. The process of claim 10, wherein the angle is between about 40° and 65°.

12. The process of claim 4, wherein step (a2) further includes:
focusing the beam so that the beam impinges the coating at a relatively small area of the substrate, and
iii) moving the beam generator relative to the substrate so that the beam successively impinges

substantially the entire exposed multilayer coating.

13. The process of claim 4, wherein step (a2) includes

i) focusing the beam so that the beam impinges the coating at a relatively small area of the substrate, and

ii) moving the beam generator relative to the substrate so that the beam successively impinges selected portions of the multilayer coating.

14. The process of claim 1, wherein the substrate is formed of a material selected from the group consisting of metals and semiconductors and combinations thereof.

15. The process of claim 1, wherein the substrate is formed of a material selected from the group consisting of Co-Ni, Co-Cr, Co-Ni-Cr, Co-Pt, Co-Ni-Pt, Co-Cr-Ta, Co-Cr-Pt, Co-Cr-Ni-B, Co-P, Co-Ni-P, PtMn, Cu, Ru, Rh, Ta, CoPt, CoCuPt, Au, rare earth elements, transition metals, mixtures thereof, and alloys thereof.

16. The process of claim 1, wherein the fullerene molecules are bonded to the coating surface with a bond strength corresponding to a fullerene desorption temperature from the monolayer of at least about 700 K.

17. The process of claim 1, wherein the fullerene comprises C_{60}.

18. The process of claim 1, wherein removing fullerene from the multilayer fullerene coating includes:

a1) applying a fullerene solvent to the multilayer coating for a period of time adequate to break the fullerene-to-fullerene intermolecular bond of the multilayer coating and inadequate to break the fullerene-to-substrate association/bond of the coating to thereby dissolve the fullerene in the coating that is not bonded to the substrate, and

a2) removing the solvent.

19. The process of claim 18, wherein applying the solvent to the multilayer fullerene coating is performed at a temperature not greater than 150°C.

20. The process of claim 18, wherein the solvent is selected from the group consisting of hexane, toluene, benzene, carbon tetrachloride, carbon disulphide, and mixtures thereof.